

Biobased Products and Bioenergy



OILSEED LUBRICANTS
OFFER ENVIRONMENTALLY
FRIENDLY BENEFITS
IN A HOME-GROWN
PRODUCT



***S**trategic Alliances Between the U.S. Department of Agriculture, Educators, Farmers, and Industry Bring Biobased Lubricants from Laboratory to Marketplace*

What if you could create high-performance motor oil from up to 17 different locally grown vegetable oils like soybean, canola, and sunflower, as well as vegetable-based ingredients such as meadowfoam? Because the ingredients could be locally grown, processed, and sold, production of such oil would create jobs and leave profits in local communities.

That's the premise behind a broadbased initiative now underway to produce a biobased oilseed lubricant that will provide new markets for farmers while making an environmentally friendly oil alternative available to the marketplace. Focusing the resources of the U.S. Department of Agriculture (USDA), Agro Management Group, Inc., the United Soybean Board, enterprising farmers, state universities, state agricultural and economic development agencies, and the U.S. Department of Energy, this effort is intended to bring the biobased motor oil known as AMG 2000 from the research stage to full marketing and production.



***A** Biobased Beauty is Born*

AMG 2000 began its life as biodegradable bicycle chain oil made from canola oil refined by agronomy scientist Duane Johnson. A private investor group called the Agro Management Group, Inc. (Agro), worked with Johnson to expand the possibilities for the oil to be used as a small engine and vehicle lubricant. Following seven years of research and development, Agro patented its AMG 2000 biobased oilseed lubricant in 1999. The oil was produced initially in Michigan by converting locally grown soybeans into high-quality crude soy oil and meal. The farmers' cooperative that first demonstrated the rural production and marketing model for AMG 2000 (Thumb Oilseed Growers/Great Lakes Oil, LLC, in Ubly, Michigan) later sold a majority of its shares to Agro.

Beyond Agro's investment, initial research and development funding came from the United Soybean Board's distribution of soybean producer checkoff funds* and the USDA. Much of the early project funding came with the stipulation that resource development for AMG 2000 be transferred to a rural community to better its economy. AMG 2000 provides a natural industrial development opportunity for rural economic revitalization, because it can be produced cleanly using local raw materials and relatively simple technology.

* Checkoff funds come from money paid by soybean farmers when they sell their crops; these funds are used to develop and promote soy-based products.

PERFORMANCE AND ENVIRONMENTAL BENEFITS ARE SIGNIFICANT

Independent testing performed by The Savant Group of Midland, Michigan, has shown that AMG 2000 is an acceptable clean-burning substitute for traditional engine oils in virtually all applications. Compared to petroleum-based oil, use of AMG 2000:

- *Produces no toxic wastes and incorporates no toxic metals into the product*
- *Generates substantially fewer toxic emissions of hydrocarbons, carbon monoxide, and nitrogen oxides*
- *Leaves few metal deposits in the used oil*
- *Releases very few volatile organic compounds (VOCs) to the environment*
- *Results in a 100% recyclable product (compared to a 48% recyclability level for petroleum-based lubricants)*
- *Offers greater product stability when exposed to oxidation than conventional vegetable oils*

In the short term, one of the major hurdles to market acceptance of AMG 2000 has been the fact that the American Petroleum Institute (API) has not certified the oil, which is required by most engine manufacturers for warranty enforcement purposes. Agro hopes to contribute to the development of new industry testing standards for vegetable-based motor oils in the future. In the meantime, the U.S. Environmental Protection Agency (EPA) is drafting new emissions guidelines for biofuel and biolubricants that will reduce air pollutants, and creating test protocols to assess compliance. Agro's efforts helped to ensure that the EPA included motor oil as a means of reducing toxic engine emissions. Once these guidelines become policy, consumer acceptance of vegetable-based oils is likely to increase. Fleet owners in particular would benefit from incentives such as Mobile Emissions Reduction Tax Credits, which will become available once the new EPA guidelines are in place. These tax credits can help large consumers such as fleet owners to offset some of the costs and risks they might incur as early users of biobased lubricants. Individual consumers may also one day be able to readily buy and use biobased motor oil, but that day is most likely several years away.



Colorado Farmers Take Biobased Oil to the

Working with farmers and cooperative extension agents, Agro developed a production and marketing model that rural communities could use to create new avenues for selling their crops. Using this model as a blueprint, farmers and ranchers in Kiowa County, Colorado, have formed a for-profit corporation, Kiowa County Growers, Inc. (KCGI), to manufacture Agro's AMG 2000 biobased motor oil. Kiowa County is a sparsely populated, agriculturally based county located on Colorado's eastern plains, approximately three hours from Denver and the entire Front Range. One of the primary reasons Agro Management Group was interested in Kiowa County as a possible hub for manufacturing and distributing its environmentally friendly oil, is that over 24,000 acres of sunflowers, a key ingredient in AMG 2000, are harvested annually in the region.

The Kiowa County Growers completed construction of their oilseed processing and production facility in Eads, Colorado, and is now producing sunflower seed-based ingredients for AMG 2000, as well as for biodegradable drip oil for irrigation wells, dust suppressants for rodeo and equestrian rings, and oil for area organic bakeries, all derived from crops produced in the region. The Kiowa Growers have also formed Great Plains Oil, LLC, to market the lubricants produced by KCGI.

Brad Buck, a Kiowa County sunflower, wheat, and beef farmer, and chairperson of the Board of Directors of KCGI, has spent a lot of his time talking to neighbors about vesting themselves in KCGI. He believes in the cooperative principle. "Cooperatives are the only way to do business in our small community of 1,700 agriculturists," he says.

When meeting with neighbors, Buck showed them a business plan, which laid out the economic potential of the new product. He explained how KCGI planned to successfully capture a share of the existing market and work out critical details in undertaking this new product venture. The all-vegetable motor oil market is just now being tapped. KCGI will start selling AMG 2000 in the Colorado market, and then go wider.



Fred S. Witte, courtesy ARS, USDA

2002 FARM BILL MANDATES FEDERAL PURCHASING OF BIOBASED PRODUCTS

An important component in the 2002 Farm Bill is the provision to establish a program for preferred procurement of biobased products by federal agencies. USDA will designate eligible products and provide recommendations for purchasing products with biobased content. Federal agencies are required to establish affirmative procurement programs for purchasing the USDA-designated products and to purchase the products with biobased content unless there is a price, performance, or availability reason not to do so.

Next Stage

"You have to be persistent to set up a company involved in a completely new venture or technology," says Buck. "Farmers are sometimes afraid to try something totally new because there is a risk and farmers have had some pretty rough years. Grain prices are too low for us to profit by just selling a bulk commodity. Value adding is where we need to go to be profitable."

"We just need to get past the idea of pumping a million-year-old form of plant—oil—out of the ground to make our industrial products and realize we can use living plants we've grown all year on top of the ground instead," says Buck, "to understand the market potential for farmers offered by the emerging biobased economy."

The Kiowa County Growers effort represents rural grassroots organizing at its best. When anticipated funding opportunities failed to materialize, the Kiowa County farmers went out and raised more money—to the extent that 85% of the initial funding for the Kiowa County Growers enterprise came from within the local farming community. Local motivation to succeed in this effort has been so strong that the Kiowa Growers' processing plant was built largely with the volunteer labor of stockholders.

According to Jim Lambert, CEO of Agro, the success of the Kiowa County Growers represents the real beauty of this model for rural community development. "By empowering communities to invest in and build these enterprises using their own resources, they build the community around the product and the product around the community. It's not a case of a big company coming in, using local resources and labor, and then taking out most of the profits. Because the community owns the company, it determines how the enterprise will grow, and in the end, the community gets the biggest piece of the pie."



Tim McCabe, courtesy ARS, USDA

FARMERS IN OTHER STATES CONSIDER BIOBASED ECONOMIC DEVELOPMENT OPPORTUNITIES

Another farmers' cooperative group in Pendleton, Oregon, is currently undertaking a feasibility study to evaluate the potential for producing and marketing Agro's biobased lubricants for the Pacific Northwest. Pendleton has been hard-hit in recent years with severe drought conditions that have seriously compromised crop production. Although the primary crops in the region now are wheat and hay, climatic conditions are potentially favorable for growing canola. Several test plots of canola are now being assessed for productivity. Additional crops that could be grown in the region for biobased lubricants include sunflower and safflower.

Groups looking to get into biobased lubricant production must consider market timing, outside funding opportunities, strength and number of local investors, crop availability, and market potential. All of these factors must come together favorably for the enterprise to be a success. For farming communities heavily investing personal resources, cutting-edge enterprises represent both a tremendous risk and a tremendous opportunity.

More Biobased Lubricant Products on the Horizon

Agro plans to commercialize four other promising biobased products for production by farmer-owned companies such as Kiowa County Growers, Inc., and Great Plains Oil, LLC.

Agro's Jim Lambert puts great stock in the value of ventures such as these. He comments that, "An industry partner is called a champion. We need champions to move promising research ideas out of universities and link new processing technologies with communities to produce new products." Lambert goes on to say that, "Without champions, no matter how remarkable the research and without the ability to make market penetration, the research will wither on a shelf."

What Makes Oilseed Lubricants So Special?



They're good for rural economies. Oilseed lubricants can be made from a variety of renewable, domestically grown crops, including soybeans, sunflower seeds, rapeseeds, and canola seeds, increasing markets for farmers and creating jobs in rural communities. The local cooperative business model lends itself well to value-adding enterprises that boost crop sales and increase the diversity of economic opportunities in a region. Farmers who belong to such cooperatives can increase their profits significantly over traditional crop-selling methods.



They're good for the environment. Because they are made primarily from vegetable-based products, oilseed lubricants are highly biodegradable, and they reduce carbon monoxide and hydrocarbon emissions. They contain no heavy metals that would require special handling and landfilling of used oil. According to Agro Management Group, the Massachusetts Highway Department has stated that although a five-gallon spill of fossil-fuel based oil constitutes a hazardous materials situation, it takes 50 gallons of spilled vegetable-based oil to qualify as a hazardous incident.



They're good for engines and equipment. Independent laboratory testing has shown that oilseed lubricants can reduce engine wear because they adhere naturally to metal and have a neutral pH. They can also boost gas mileage.

TIMELINE

• Colorado State University researcher Duane Johnson, under sponsorship of Agro Management Group, performs research on canola oil products.

• Canola oil products are reformulated as small engine and car lubricant.

• Michigan farmers express interest in value-added products for soybeans and canola.

• Agro Management Group selects Ubly, Michigan, for first farming community to produce AMG 2000.

• Great Lakes Oil, LLC, formed in Michigan as partnership of Thumb Oilseed Producers Cooperative, Agro Management Group, and three county economic development agencies.

• Agro Management Group patents AMG 2000 and undertakes the "Drive Across America" campaign to draw attention to the product's benefits.

• Thumb Oilseed Producers Cooperative opens soybean-crushing plant in Michigan.

1992

1995

1996-1997

1998

1998-1999

1999

MODEST FEDERAL INVESTMENTS MATCHED BY NEARLY 3:1

Research and development investments in biobased lubricant through mid-2002:



Total Federal Investment: \$697,000

U.S. Department of Agriculture\$677,000
U.S. Department of Energy.....\$20,000

Total state and private investment: \$1,925,000

Agro Management Group, Inc.\$50,000
United Soybean Board soybean producer
checkoff funds\$435,000
Thumb Oilseed Growers (MI)\$250,000
Kiowa County Growers (CO)\$250,000
State of Montana\$40,000
Private investors.....\$900,000

Lessons Learned Along the Way Influence Marketing Strategies

One of the early difficulties in sustaining profits for the farming cooperatives that have invested in biobased lubricant production has been building and sustaining markets for the oil. Depending on a small number of large fleets to purchase the oil produced has proven to be risky, so Agro and the cooperatives have been working to expand and diversify their customer bases so that no one customer is purchasing a majority of the oil produced in a given year. Agro officials hope that by demonstrating AMG 2000's ability to assist fleets in meeting the proposed new EPA emissions guidelines, potential customers will be inspired to make use of Mobile Emissions Reduction Tax Credits to offset any higher costs incurred in using biobased lubricants instead of traditional petroleum-based products.

• Kiowa County, Colorado, farmers begin exploring potential for locating an oilseed processing plant in the state and receive financial backing from the Kiowa County Economic Development Foundation and the Kiowa County Board of Commissioners.

• Farmers in Colorado form Kiowa County Growers (KCGI), incorporate, and begin constructing a sunflower processing plant for AMG 2000. The group obtains exclusive rights to market AMG 2000 and related products in Colorado and portions of surrounding states.

• Thumb Oilseed Producers Cooperative/Great Lakes Oil, LLC, of Michigan sells its shares to Agro Management Group, Inc.

• Kiowa County Growers of Colorado name first permanent CEO and make second stock offering to existing shareholders.

• Duane Johnson leaves Colorado State University and moves to Montana State University, where he continues to pursue bio-oils research at MSU's Northwest Agricultural Research Center in Kalispell, Montana.

• Farmers in Oregon begin exploring the feasibility of building an oilseed lubricant production facility to serve the Pacific Northwest. Primary crops would be canola, sunflowers, and safflowers.



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Web-based Resources

Agro Management Group, Inc.
www.agromgt.com

Kiowa County Growers, Inc.
www.kiowacountygrowers.com

Great Plains Oil, LLC
www.greatplainsoil.com



Connecticut College's 2000 Inherit the Earth Silver Medal for outstanding contribution to sustainable technology that benefits the environment of the past year.



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